

# Assignment 65-2

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## 1 5 cards are drawn from a shuffled deck

A)Probability of exactly 1 Ace

The probability of exactly one ace is the probability of an ace times the decreasing probabilities that the other cards are non-aces. Probability that the first card is an ace is  $\frac{4}{52}$ . Then the probability that the second card is non an ace is  $\frac{48}{51}$ . We continue this decreasing probability with the other 3 cards. They become:

$$\frac{47}{50}, \frac{46}{49}, \frac{45}{48}$$

We take the product of these to find the probability of the hand:

$$P(\text{exactly one ace}) = \frac{4}{52} \cdot \frac{48}{51} \cdot \frac{47}{50} \cdot \frac{46}{49} \cdot \frac{45}{48} = \frac{3243}{54145}$$

B)Probability of at least 1 Ace The probability of at least 1 Ace is the 1 - P(no aces). The probability of no aces in a 5 card hand is the product of the 5 decreasing probabilities of non-ace cards.

$$P(\text{no ace}) = \frac{48}{52} \cdot \frac{47}{51} \cdot \frac{46}{50} \cdot \frac{45}{49} \cdot \frac{44}{48} = \frac{35673}{54145}$$

Then we use

$$P(\text{at least 1 ace}) = 1 - P(\text{no ace})$$

So

$$P(\text{at least 1 ace}) = 1 - \frac{35673}{54145} = \frac{18472}{54145}$$

## 2 You roll a die 5 times. What is the probability of the same number appearing twice

there are  $6^5$  possibilities for 5 die rolls. There are 60 possibilities for rolls with the same number appearing twice. So the probability of getting the same

number twice in 5 rolls is  $\frac{10}{6^4}$

**3 I roll 2 die and get 2 values X and Y. Find the PMF and Range of  $Z = X - Y$**

Range = [-5,-4,-3,-2,-1,0,1,2,3,4,5]

$$PMF = \begin{cases} \frac{1}{36} & z = -5 \\ \frac{1}{18} & z = -4 \\ \frac{1}{12} & z = -3 \\ \frac{1}{9} & z = -2 \\ \frac{1}{6} & z = -1 \\ \frac{1}{36} & z = 0 \\ \frac{1}{6} & z = 1 \\ \frac{1}{36} & z = 2 \\ \frac{1}{9} & z = 3 \\ \frac{1}{12} & z = 4 \\ \frac{1}{18} & z = 5 \\ \frac{1}{36} & z = 5 \end{cases}$$